Western Electric Co., Incorporated, Equipment Engineering Branch, Hawthorne.

(6 Pages, Page 1 Issue 3 BT 502173 October 5, 1923.

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This M. of O. Sheet was prepared from Issue 14 of T-502173. and ring of the cord.

METHOD OF OPERATION SECTION OF SELECTOR CIRCUIT DESCRIPTION (A) and

Incoming from Spl. "A" Switchboard With No Test Keys At "A" Position. Panel A serious and of bours of avious wretter at Machine Switching System.

DEVELOPMENT

1. PURPOSE OF CIRCUIT

This circuit is used to establish connections for calls incoming from an "A" switchboard in a full mechanical office. It is used by the sero operator in verifying persistent busy reports and re-establishing cut-off na oli halmaska jaunski jili soomango bas suoteeles got Tosiklon 3. In position 2 2 4 to 11, ti ti suoteeles go connections.

2. WORKING LIMITS TO DEPUTE AND LONG TO STATE OF STATE OF

None.

OPERATION

3. PRINCIPAL FUNCTIONS

This circuit selects an idle sender and establishes connections between the "A" operator's cord circuit and a final selector. Its principal functions are as follows:

- 3.1 Selection of idle sender and proper idle final selector, repeating pulses from final during final selection and dismissing sender at end of selection.
- 3.2 Establishing the talking connection.
- 3.3 Returning to normal. The state of the service with th

ley operated, short circults the tractive winding a 4. CONNECTING CIRCUITS opera detric 5 1 della della constant del gallace

This circuit connects with an intercepting and zero operator's cord circuit, an incoming trunk sender and a final selector. quises finish eseculary 6-87 has 8-85 b-86 ese of

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DESCRIPTION OF OPERATION

5. SENDERHINTING

When the zero operator inserts the plug of a cord in the outgoing jack. the (SL) relay operates over the sleeve thru its winding in series. The

(SL) relay operated, lights the 2-J busy lamps, which remain lighted until the circuit returns to normal. The (PLS) relay also operates over the tip and ring of the cord. The (PLS) relay operated, operates the (REL) relay which in turn operates the (L) relay thru its secondary (800 ohm) winding. The (L) relay operated, locks thru its primary (1200 ohm) winding to ground on cam I and operates the R magnet, advancing the switch to position 2. As the switch enters position 1 3/4, the (L) relay locks thru its primary winding to ground in the associated sender circuit over the test lead (TST) if the selector is on a busy sender and the (P) relay operates, opening the operating circuit for the (L) relay. The (P) relay operated, locks to ground on the armature of the (REL) relay and operates the sender selector stepping magnet (SEL.STP), starting the selector hunting for an idle sender. When an idle sender is found the (L) relay releases as there is now no ground on the test lead (TST). The (L) relay released, puts ground on the TST lead making it busy to other hunting selectors and operates the R magnet, advancing the sequence switch to position 3. In positions 2 3/4 to 11, the sender is made busy by ground on the armature of the (P) relay. When the sequence switch enters position 3, the (CI) relay operates. The (CI) relay operated connects the I. REG. FT. FR and CI leads thru to the sender.

6. TRANSPERRING THOUSANDS REGISTRATION

While the selector is hunting for an idle sender, the sere operator may dial the thousands digit in which case the (PLS) relay releases and reoperates in synchronism with the impulses sent out by the dial. The (REL) relay being a slow release relay, remains operated, causing the TH-STP magnet to operate and release with each impulse from the dial thus setting up the thousands digit on the TH register. The (ADV) relay operates and being slow release relay remains operated while the impulses are being sent out by the dial. Each time the (PLS) relay releases, the (B) relay operates thru the break contacts of the TH-STP magnet. The (B) relay operated, (a) connects ground to the (RML) relay thus preventing it from momentarily releasing during dialing (b) connects ground to the TH-STP magnet thus insuring its operation in case the impulses from the (PLS) relay are not of sufficient duration. The (B) relay remains operated until the TH-STP magnet has operated, at which time it releases. The (ADV) relay operated, short circuits the inductive winding of the (TR) relay, preventing it from operating as the TH-2 brush steps off normal. After the digit has been dialed the (ADV) relay releases, allowing the (TR) relay to operate. The (TR) relay operated, (a) transfers the impulse lead from the TH-STP magnet to the I lead of the sender (b) connects battery to the TH-4 TH-5 and TH-6 registers which set up the register relays in the sender over leads REG. FT and FR. as determined by the setting of the TH register.

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7. BRUSH SELECTION The sale of deliand was to delive consuperted

The succeeding digits registration is set up on registers in the sender. As soon as the first impulses of the hundreds digit is dialed, the sender functions and connects ground to lead CI, operating the (CI-1) relay. The (CI-1) relay operated, (a) holds the (TR) relay operated to ground on the CI lead (b) disconnects the battery used in thousands registration from the TH-4, TH-5 and TH-6 registers (c) operates the TH-STP magnet thru the TH-1 brush and off-normal terminal under control of its break contact stepping the register to normal (d) operates the (CI-2) relay. The (CI-2) relay operated, disconnects the REG, FT and FR leads from the arcs of the TH register and connects the PT and FR leads for brush selection and the REG lead for registration of the succeeding digits.

in position 8 0 % 10 h

8. BRUSH SELECTION CONTINUED

When the FT and FR leads are closed thru to the sender, the (L) relay operates in a circuit from battery through its primary winding can F, (CI-2) relay operated, brush 4, over lead FT, thru the sender, back over lead FR, brush 5, (CI-2) relay operated, to ground on can I. The (L) relay operated locks over can N and the fundamental circuit, advances the sequence switch to position 4, and operates the UP magnet. As the selector moves upward, ground from the A commutator is intermittently connected to the FT lead, causing the stepping relay in the sender to release and re-operate until the proper brush has been selected. When sufficient impulses have been sent back to satisfy the sender, the fundamental circuit is opened in the sender, releasing the (L) relay. The (L) relay released, releases the UP magnet stopping the upward movement of the selector and advances the sequence switch to position 5. With the sequence switch in position 5, the trip magnet (TM) operates.

9. GROUP SELECTION

After hundreds registration has taken place in the sender and with the sequence switch in position 5, the fundamental circuit is again closed over leads FT and FR operating the (L) relay. The (L) relay operated (a) locks thru cam N and over the fundamental circuit (b) operates the UP magnet for group selection. The trip magnet (TM) being operated in position 5 to 7 causes the previously selected set of brushes to trip as the selector moves upward. Ground is intermittently connected to the FT lead by the B commutator, causing the stepping relay to release and reoperate until the proper group has been selected. When sufficient impulses have been sent back to satisfy the sender, the fundamental circuit is opened, releasing the (L) relay. The (L) relay released, releases the UP magnet thus stopping the brushes at the selected group and advances the sequence to position 7. The (L) relay re-operates in position 7 thru its secondary winding to ground on cam M and advances the sequence switch to position 8. Should the first trunk of the selected group be idle, as

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the sequence switch enters position 8, the (L) relay releases but should the first trunk of the group be busy, the (L) relay locks thru its primary winding to ground on the sleeve of the busy trunk.

10. THUNK HUNTING FIRST . ID has been been a document on any transper waken

The (L) relay held operated in position 8, operates the UP magnet, causing the selector to travel upward. The (L) relay is held operated between terminals thru its secondary winding to ground on the C commutator. When an idle trunk is found, the (L) relay releases there is no ground on the sleeve terminal. The (L) relay released, releases the UP magnet, stepping the brushes on the selected trunk terminals and advances the sequence switch to position 9. The (L) relay released ground the sleeve of the trunk making it busy to other hunting selectors. In position 8 3/4 to 16 14 the trunk is made busy by ground on cam I.

11. SELECTION BEYOND and second secon

With the sequence switch in position 9, the (L) relay operates thru its primary winding to ground on cam I. The (L) relay operated, locks over the ring to ground in the final selector and advances the sequence switch to position 10. In position 10 the tip side of the fundamental circuit is closed to the tip terminal of the selected final trunk for selection beyond.

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When the selection beyond has been completed, ground is removed from the ring in the final, releasing the (L) relay. The (L) relay released, advances the sequence switch to position 11, the A cam advancing it to position 16 thereby connecting the tip and ring thru to the cord circuit for talking. With the sequence switch in positions 11 to 18, the high resistance winding of the (SL) relay is short circuited, thus operating a marginal relay in the cord circuit which connects talking battery to the tip and ring.

13. SENDER RELEASED THE PROPERTY S. T. SELECTE TOTAL

When the sequence switch leaves position 10, the (PLS) relay releases, releasing in turn the (REL), (P), (CI), (CI=1), (CI=2) and (TR) relays. The sender is now disconnected from this circuit.

14. REGULAR DISCONNECTION It and explan the management of the property

When the plug of the zero cord is removed from the jack, the (SL) relay releases. The (SL) relay released, advances the R switch to

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position 18. In position 18, the down (D) magnet operates, returning the selector brushes to normal. When the brushes reach the bottom of the frame, ground on the Y commutator advances the sequence switch to normal.

15. OVERFLOW

Should all the trunks in a group be busy, the selector while trunk hunting (in position 8) goes to the top of the group and rests on the overflow terminals. As the sleeve of the overflow terminals is not grounded, the (L) relay releases, releasing the UP magnet and advancing the switch to position 9. Ground on the Z commutator advances the sequence switch to position 12, the A cam advancing it to position 16. In position 16, the Z commutator advances the switch to position 17. In position 17, the #150 or #149 interrupter and 500 ohm resistance are connected across the tip and ring thereby flashing the supervisory lamp in the cord circuit as an indication that all the trunks in the group are busy. When the plug of the cord is withdrawn from the jack, the (SL) relay releases and advances the sequence switch to position 18. From this point on, the switch and selector are returned to normal as described in paragraph 14.

16. TELL-TALE

Should the selector travel to the top of the frame during selection, ground on the X commutator advances the switch to position 10. As the ring is not connected thru to a final the (L) relay releases and advances the switch to position 11, ground on the X commutator advancing it to position 17. In position 17, the supervisory lamp in the cord circuit flashes and the circuit returns to normal when the plug of the cord is withdrawn from the jack as described under paragraph 15.

17. SELECTING A BUSY LINE (WHERE "NO TEST" FRATURE IS USED.)

If the operator desires to establish a connection with a busy line, the 69-A multiple key is depressed, operating the (NT) relay. The (NT) relay operated, (a) locks in position 1 3/4 to 11, (b) in position 10 connects the secondary winding of the (L) relay and the 500 chm resistance (F) in parallel with the primary winding of the (L) relay which is locked over the ring to ground thru a marginal relay in the final. The marginal relay (P.B.X.) in the final, due to the low resistance of the parallel combination, operates and causes the final to omit the busy test. When ground is removed from the ring in the final, the (L) relay releases, advancing the sequence switch and causing the circuit to function as in paragraph 12. If "No Test" Feature is not used omit paragraph 17.

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ed to mottod ed doser today'd the real party of the bottom of the 18. DISCONNECTION BEFORE CALL IS COMPLETED

Should the plug of the cord be withdrawn from the jack in any position from 3 to 17 of the sequence switch, the (SL) relay releases, advancing the switch to position 18, the switch and Selector being restored to normal as described under paragraph 14.

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ENG: J.C.G. APP'D: H. L. MOYNES E.R.C.

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CIRCUIT REQUIREMENTS

THE HEADIUST REQUIREMENTS SHOWN BELOW ARE FOR MAINTENANCE USE ONLY

OPERATE

NON-OPERATE

178-AD (ADV)

Special requirements to insure slow release.

After a soak of

(On open circuit).

Readj. .107 amp.

Test .113 amp.

W.C.C. .640 amp.

Hold:

Hold: W. C.C..371 amp.

NOTE: To prevent chattering, the "makebefore-break" spring combination of this relay shall be so adjusted that the spring which normally makes on the back contact, will give the greatest possible contact pressure against the back contact.

178-AH (REL)

Special requirements to insure slow release.

Test .019 amp.

Readj. .018 amp. Readj. .001 amp. Test .0009 amp.

W.C.C. .041 amp.

NOTE: To prevent chattering, the "makebefore-break" spring combination of this relay shall be so adjusted that the spring which normally makes on the back contact, will give the greatest possible contact pressure against the back contact.

E530

Readj. .013 amp.

Readj. .002 amp.

(CI-1)

Test .017 amp.

Test .001 amp.

(NT)

W.C.C. .021 amp.

E533

Special requirements to insure fast operation.

(L)

Readj. .017 amp. Readj. .012 amp.

Inner

Test .0178 amp. Test .0111 amp. W.C.C. .018 amp.

wdg.

(1220

ohms!

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CIRCUIT REQUIREMENTS

THE READJUST REQUIREMENTS SHOWN BELOW ARE FOR MAINTENANCE USE ONLY

	OPERATE	NON-OPERATE	RELEASE
Outer	Test .045 amp.	sels equal of street	Tipos Liberi
Wdg. (800	W.C.C053 amp.		200 6 40 31
ohms).	::	e equipped with specia t 163914) unless an E	
E827	Special Requireme	nts to insure fast ope	eration.
(PIS)	Readj0145 amp.	Readj013 amp.	
Inner	Test .015 amp.	Test .0125 amp.	ns 1980.0 .W
Wdg.	W.C.C026 amp.		
(500		ent chittering, Wie "	
Ohms).		meldaco getue "moord	
		be on so lines will	
Outer	Test .020 amp.	rion do few salings of t	Acat be
wdg.		Jordsen Kand out no e	
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E828		nts to insure fast ope	
(B)		Readj0065 amp.	
		Test .006 amp.	
	W.C.C075 amp.		
	(Armature travel	.015").	
E1173	Readj021 amp.	Readj012 amp.	was ex letter .
(CI-2)	Test .025 amp.	Test .011 amp.	HERE BUILDING TO THE STATE OF T
	W.C.C029 amp.	Do on ad II.de wast	
		non Boles anlage wit	
E1205	Readj015 amp.	, 프로마스(CE) (1988년 - 1989년 - 1984년 - 1984년 - 1984년 - 1984년 - 1982년 - 1988년 - 1988년 - 1988년 - 1982년 - 1982년 - 198	100 C
(TR) :	Test .018 amp.	Test .0095 amp.	
Inner	W.C.C021 amp.		
wdg.			
T1750	Ponds 017 own		Readj002 amp.
E1359	Readj017 amp. Test .023 amp.		Test .0019 amp.
(P) .	W.C.C029 amp.		rest sours amp.
	1.0.0. July amp.		
	NOME: Ma marrant	abottoming the Umple	

NOTE: To prevent chattering, the "makebefore-break" spring combination of this relay shall be so adjusted that the spring which normally makes on the back contact will give the greatest possible contact pressure against the back contact.

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CIRCUIT REQUIREMENTS

THE READJUST REQUIREMENTS SHOWN BELOW ARE FOR MAINTENANCE USE ONLY

	OPERATE	NON-OPERATE	RELEASE	
E1370 (CI)	Readj027 amp. Test .035 amp. W.C.C043 amp.		Readj003 amp. Test .0015 amp.	CONTRACTOR OF THE PERSON NAMED IN COLUMN NAMED
E1439 (SL) Inner wdg. (34 ohms).	to test requirement Readj074 amp.	inner winding is proposes of windings in series Readj050 amp. Test .0475 amp.		
Wdgs. : in series aiding.	Test .027 amp. W.C.C032 amp.			

ENG .--TPI:ML. 2/28/22. CHK'D, -- ACIH: CWP

APPROVED - C.L. SLUYTER, G.M.L.

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